

cluded in the debridement. Removal of sufficient bone to allow a well-padded, soft-tissue flap on the end of the bone is far superior to attempts at skin grafting. It is frequently advisable to remove the proximal third of the nail in compound injuries involving this region. This procedure allows free drainage of infection about the eponychium, decompresses painful subungual hematomata, and may result in a smoother second-nail growth.

A special problem of the terminal phalanges is the so-called baseball fracture, or avulsion, of the extensor tendon with displacement of a chip from the articular surface of the terminal phalanx. Usually the extensor tendon does not retract and immediate fixation in plaster, maintaining the distal joint in hyperextension and the proximal interphalangeal joint in flexion for six weeks, is the treatment of choice. The results of those injuries which include a chip fracture are, as a rule, much better than those consisting of tendon avulsion only. The results from open reduction are less favorable than those with closed treatment, instituted early.

FRACTURES OF THE MIDDLE AND PROXIMAL PHALANGES

The displacement of the fragments following fractures in these regions may require immobilization with the finger in either flexion or extension, as dictated by x-ray appearance. In general, fractures distal to the middle of the shafts of those bones will require fixation in flexion.

Skeletal traction is usually indicated in comminuted or compounded fractures of these bones, and should be applied in line with the desired position of the finger.

Compounded fractures of these regions present the poorest end results of this entire group of fractures, because of tendon adhesions and joint fixations. Immobilization time should be minimum, and active motion can usually be instituted within two to four weeks.

FRACTURES OF THE METACARPALS

The first metacarpal is frequently fractured near its base and may be of two general types. The transverse, impacted type, not involving the carpal-metacarpal joint, does not require traction, and simple correction of the adduction deformity by disimpaction and abduction is sufficient. Those fractures of the base of the first metacarpal, extending obliquely into the joint, are unstable, usually shortened and require skeletal traction for about four weeks.

Fractures of the metacarpal shafts usually result in dorsal angulation, because of the stronger pull of the flexor muscles, and should be maintained in well-moulded plaster, incorporating at least the neighboring fingers. The fingers themselves may be in partial flexion, but should be supported by the cast, which fits firmly beneath the metacarpal heads. These fractures are prone to be oblique and to shorten, and again skeletal traction should be applied and maintained to overcome all over-riding.

Fractures at the neck of the metacarpal often present a difficult problem. Impaction should be broken up and padded pressure applied within the cast. Acute flexion of the finger, and upward pressure in line with the proximal phalanx, may obtain a reduction otherwise impossible to achieve. The metacarpo-phalangeal joint is especially vulnerable to puncture wounds, which require immediate and adequate debridement.

IN CONCLUSION

In general, emphasis should be placed upon the following:

- (1) Early definitive care of fractures of the hand to a point that they are considered a surgical emergency.
- (2) Accurate reduction, and traction when necessary.

- (3) The use of nonpadded, well-moulded plaster casts which obtain maximum immobilization of the fragments, and yet allow maximum function and use of the non-injured portions of the extremity. Use of the uninvolved portions of the hand during immobilization should be encouraged, for it will greatly speed recovery and lessen disability resulting from fractures of the hand.

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TREATMENT OF INDUSTRIAL EYE INJURIES*

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THE prerequisites to good industrial ophthalmology are good light, good vision, and good instruments. Each emergency unit should have a separate cubicle for eye-cases. In this space there should be good light, a binocular loupe, a few drugs, including an anaesthetic, such as pontocaine or butyn, also mercurochrome (one per cent) and a solution of boric acid; a sharp-pointed and a dull spud, and alcohol (seventy per cent) for sterilizing instruments. I feel that argyrol should not be on this list, as it is too often confused with tincture of iodine. Yellow oxide of mercury is irritating. The use of mydriatics, except in extreme cases, should be left to the judgment of the ophthalmologist.

Foreign bodies of the cornea should be treated with great respect. Those in the center should be referred to an ophthalmologist, as bad results are costly in man-hours, and large permanent disability ratings. Those at the limbus do not justify such great care. Give the anaesthetic time to work, and the patient will be more coöperative. If the foreign body is superficial, attempt to remove it with a tightly-wrapped, moist cotton applicator. If unsuccessful, use your spud, follow with a drop of mercurochrome, which not only stains and may show other wounds or foreign bodies, but also acts as a germicide. Inspect the everted lid of the injured eye, and also examine the opposite eye. Apply a pad for an hour or two, as, according to Behrens, the lachrymal secretion is an effective germicide. Instruct the patient to return the same day, if irritation continues, and also to return the next day for observation and a rating of vision if the eye is in good condition.

Every red eye seen is not necessarily an injured eye or a conjunctivitis. Conjunctivitis usually shows redness, swelling, and discharge. Iritis and glaucoma also cause redness in the eye, but no discharge. These two conditions are too often treated as a simple conjunctivitis, until visual damage has been done. Severe pain indicates a deeper inflammation; wherefore, if not sure of your diagnosis, refer the case to an ophthalmologist. A conjunctivitis usually responds rapidly to treatment.

Kerato-conjunctivitis is difficult to diagnose in the early stages. The patient usually has a tearing, red eye, with the sensation of a foreign body or an arc burn. Eventually, follicles appear in the lower cul-de-sac. There may be a slight rise in temperature; later on, swelling and tenderness of the preauricular glands on the affected side.

Flash burns always involve both eyes, and usually the symptoms do not appear for several hours after exposure, with photophobia, tearing and sensation of sand in the eyes. Treatment is a mild anesthetic, combined with adrenalin or other vasoconstrictor, cold compresses and protection from light. The discomfort lasts only a few hours.

* One of several papers in a Symposium on "Industrial Medicine in Wartime—the Widening Field of Industrial Medicine." Papers collected by Rutherford T. Johnstone, M. D.

Chemical burns require copious flushing with water or boric acid. Always evert the upper lid, and remove any foreign particles and flush for twenty minutes.

These are the common cases which come to the emergency station. Any penetrating injury should immediately be referred to a specialist. Let me repeat: approach all injured eyes with clean hands, good light, and good vision.

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TREATMENT OF BURNS*

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THE fundamental principles in the management of burns are so well known that it is hardly necessary to repeat them:

1. Treatment of shock and relief of pain,
2. Prevention of infection and local treatment,
3. Attention to early functional return,
4. Correction of deformities or defects by skin graft, etc.

The treatment of shock involves relief from pain with copious doses of morphine. In a healthy adult male, as much as $\frac{1}{2}$ gr. of morphine may be given at one time, and repeated whenever necessary.

REPLACEMENT OF LOST PLASMA

Plasma should be given in adequate amounts until the plasma balance has been reached. In a severe burn case, the author has given as much as 3000 cc. within eight hours. The most reliable method of calculating the amount of plasma required is that of Harkins:—100 cc. of plasma for every point above 45 in the hematocrit reading.

In the initial treatment of shock, the use of adrenal cortical extract has been reported favorably by some investigators and discounted by others. The action of the cortical extract is to restore the capillary walls to their normal state of permeability, and thus prevent protein loss. If epinephrine is used to any extent in cases of severe burns, frequent blood determinations of epinephrine should be made. In this connection, all cases of severe burns should have frequent plasma chloride determination and hematocrit readings, until the danger stage is passed.

Replenishing fluid loss can usually be accomplished by intravenous normal saline. It should be given in quantities sufficient to produce at least 1,000 cc. of urine daily. Fruit juices, to which glucose has been added, are important in combating hepatic damage.

It is imperative that the burned areas receive a meticulous and carefully-planned debridement and cleansing over the entire area. It is only thus that infections are prevented and convalescence is shortened. After the patient has been anesthetized with a general anesthetic or large doses of morphine, or a general anesthetic that is advisable in the circumstances, the cleansing is begun. Copious amounts of green soap are used in the first stage of the cleaning process. This is followed by irrigations (using sometimes gallons of sterile normal saline) to irrigate the burned fields.

DEBRIDEMENT

The debridement is the next important stage. This procedure is entitled to the same aseptic precautions as

a surgical operation. The surgeon should scrub his hands and wear a mask, cap, gown and sterile gloves. All dead and unhealthy looking tissues are excised. Blebs should be left intact for two reasons: In the first place, they conserve the plasma which is in the bleb, and will be reabsorbed into the general circulation; and, in the second place, one less avenue of infection is kept closed.

To prove any one method to be superior to all others, stringent scientific checks and rechecks should be made with control series of large numbers of cases where burn cases can be classified in regard to (a) extent of burn, (b) depth of burn, (c) preliminary soiling, (d) length of time between burn and inauguration of treatment, (e) age, (f) structures involved.

On one occasion a patient presented himself with what appeared to be identically extensive burns on both hands, fingers and arms. For comparison, the left arm was sprayed with Pickrell's solution and a triple dye-method was used on the right arm. Daily salt water immersions, with active movement of the fingers, were begun on both hands after the fourth day. It was very noticeable that the hand, which was being sprayed with Pickrell's solution, responded far better. There was less pain on active motion, and the end result was superior to the hand which had received the triple dye treatment. In addition, two infected areas developed after the use of the triple dye with the formation of pus.

LOCAL APPLICATIONS

Since 1925, when tannic acid became the popular treatment for burns, literally dozens of medicaments in the forms of solutions, ointments and chemicals have been enthusiastically recommended.

Every chemical, agent, ointment or spray has its champion. The author has used Pickrell's 3 per cent sulfadiazine spray on many occasions with very satisfactory results.

True bactericidal action is exercised from the outset. The sulfadiazine spray contains a wetting agent. The author uses no dressings on burned areas. The burned areas are sprayed daily with Pickrell's solution, and although there is preliminary discomfort, the patient feels much relieved fifteen or twenty minutes after the spraying has been applied. Recently the use of pressure-dressing has become popular, with splinting in cases where the extremities have been badly burned. It is said that lymphatic circulation of the part is restricted, and there is marked decrease in exudation from the surface. Practically no infections have followed this procedure. This is a valuable adjunct to treatment when skin graft is contemplated, since the poor results of skin grafting are usually attributable to low-grade infections in the eschar and granulation areas. In this connection it is advisable that no skin grafting be accomplished until sterile cultures from the burned areas have been obtained.

The transparent jacket system recently advanced by Beverly Douglas has many advantages, especially when proper hospital facilities are available, and it appears to be a valuable addition in the treatment of burns. This jacket is a transparent, cylindrical tubing of cellulose acetate with one end closed by a flat, or rounded head of the same material. This type of jacket may be hermetically sealed at a point above the burned area. The atmosphere surrounding the wound may be regulated at will in these jackets. The hermetically-sealed closure and covering provide many useful purposes. The patient may turn in bed, thus preventing development of contractures, decubitus ulcers and outside sources of contamination. The jackets may be completely filled with normal saline or other solution, and a constant flow established by the drip method. The advantages of visibility is not minimal, since early evidence of pressure sores, decubitus ulcers, etc., can be detected.

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